09/998,551

[redacted]

```
=> s surface plasmon resonance?/ti
L11       3170 SURFACE PLASMON RESONANCE?/TI

=> s l11 and (species or taxon?)
L12        119 L11 AND (SPECIES OR TAXON?)

=> dup rem l12
PROCESSING COMPLETED FOR L12
L13         91 DUP REM L12 (28 DUPLICATES REMOVED)

=> s l13 and hybridization
L14         11 L13 AND HYBRIDIZATION

=> s l14 and py<=1999
   2 FILES SEARCHED...
   4 FILES SEARCHED...
L15          0 L14 AND PY<=1999

=> d l14 bib abs 1-11

L14  ANSWER 1 OF 11  BIOSIS  COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN   2003:445205  BIOSIS
DN   PREV200300445205
TI   A polymerase chain reaction-based ribosomal DNA detection technique using
     a surface plasmon resonance detector for a
     red tide causing microalga, Alexandrium affine.
AU   Asai, Ryoichi [Reprint Author]; Nakanishi, Keijoro; Nakamura, Chikashi;
     Ikebukuro, Kazunori; Miyake, Jun; Karube, Isao
CS   Research Center for Advanced Science and Technology, The University of
     Tokyo, Meguro, Tokyo, 153-8904, Japan
     ryoichi.asai@aist.go.jp
SO   Phycological Research, (June 2003) Vol. 51, No. 2, pp. 118-125. print.
     ISSN: 1322-0829.
DT   Article
LA   English
ED   Entered STN: 24 Sep 2003
     Last Updated on STN: 24 Sep 2003
AB   A detection technique with a DNA probe was developed for the bloom-forming
     alga Alexandrium affine harvested in Japan.  The design of this probe was
     based on the sequence polymorphism within the 28S ribosomal DNA (rDNA) of
     this strain using the BIAcoreTM 2000 biosensor, which determines surface
     plasmon resonance.  The specific DNA sequence in 28S rDNA for A. affine
     was determined by sequence data analysis, and a probe was designed for the
     detection of A. affine.  A fragment of the 28S rDNA from A. affine was
     amplified by polymerase chain reaction and applied to the BIAcoreTM sensor
     system, and the target DNA was selectively recognized by species
     -specific hybridization using two DNA probes: a fluorescein
     isothiocyanate (FITC)-labeled probe and a biotin-labeled DNA probe.  Using
     FITC-labeled anti-immunogloblin G antibody, enhancement of the response
     for the target DNA can be detected directly as a resonant unit change.  In
     this detection method, a difference within only 20 base pairs of the
     target could be detected, and specific detection of A. affine was achieved
     intraspecifically.

L14  ANSWER 2 OF 11     MEDLINE on STN
AN   2002699192     MEDLINE
DN   PubMed ID: 12460281
TI   Label-free detection of 16S ribosomal RNA hybridization on
     reusable DNA arrays using surface plasmon
     resonance imaging.
AU   Nelson Bryce P; Liles Mark R; Frederick Kendra B; Corn Robert M; Goodman
```

09567863

Robert M
CS Department of Chemistry, University of Wisconsin-Madison, 1101 University Avenue, Madison, WI 53706-1396, USA.
NC GM59622-02 (NIGMS)
SO Environmental microbiology, (2002 Nov) 4 (11) 735-43.
Journal code: 100883692. ISSN: 1462-2912.
CY England: United Kingdom
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 200301
ED Entered STN: 20021217
Last Updated on STN: 20030131
Entered Medline: 20030130
AB In this paper, we describe the detection of bacterial cell-extracted 16S ribosomal RNA (rRNA) using an emerging technology, surface plasmon resonance (SPR) imaging of DNA arrays. Surface plasmon resonance enables detection of molecular interactions on surfaces in response to changes in the index of refraction, therefore eliminating the need for a fluorescent or radioactive label. A variation of the more common SPR techniques, SPR imaging enables detection from multiple probes in a reusable array format. The arrays developed here contain DNA probes (15-21 bases) designed to be complementary to 16S rRNA gene sequences of Escherichia coli and Bacillus subtilis as well as to a highly conserved sequence found in rRNAs from most members of the domain Bacteria. We report **species**-specific **hybridization** of cell-extracted total RNA and in vitro transcribed 16S rRNA to oligonucleotide probes on SPR arrays. We tested multiple probe sequences for each **species**, and found that success or failure of **hybridization** was dependent upon probe position in the 16S rRNA molecule. It was also determined that one of the probes intended to bind 16S rRNA also bound an unknown protein. The amount of binding to these probes was quantified with SPR imaging. A detection limit of 2 micro g ml-1 was determined for fragmented E. coli total cellular RNA under the experimental conditions used. These results indicate the feasibility of using SPR imaging for 16S rRNA identification and encourage further development of this method for direct detection of other RNA molecules.

L14 ANSWER 3 OF 11 MEDLINE on STN
AN 2001124677 MEDLINE
DN PubMed ID: 11195491
TI **Surface plasmon resonance** imaging measurements of DNA and RNA **hybridization** adsorption onto DNA microarrays.
AU Nelson B P; Grimsrud T E; Liles M R; Goodman R M; Corn R M
CS Department of Chemistry, University of Wisconsin, Madison 53706-1396, USA.
NC GM59622-02 (NIGMS)
SO Analytical chemistry, (2001 Jan 1) 73 (1) 1-7.
Journal code: 0370536. ISSN: 0003-2700.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 200102
ED Entered STN: 20010322
Last Updated on STN: 20010322
Entered Medline: 20010222
AB Surface plasmon resonance (SPR) imaging is a surface-sensitive spectroscopic technique for measuring interactions between unlabeled biological molecules with arrays of surface-bound **species**. In this paper, SPR imaging is used to quantitatively detect the **hybridization** adsorption of short (18-base) unlabeled DNA

oligonucleotides at low concentration, as well as, for the first time, the **hybridization** adsorption of unlabeled RNA oligonucleotides and larger 16S ribosomal RNA (rRNA) isolated from the microbe Escherichia coli onto a DNA array. For the **hybridization** adsorption of both DNA and RNA oligonucleotides, a detection limit of 10 nM is reported; for large (1,500-base) 16S rRNA molecules, concentrations as low as 2 nM are detected. The covalent attachment of thiol-DNA probes to the gold surface leads to high surface probe density (10(12) molecules/cm2) and excellent probe stability that enables more than 25 cycles of **hybridization** and denaturing without loss in signal or specificity. Fresnel calculations are used to show that changes in percent reflectivity as measured by SPR imaging are linear with respect to surface coverage of adsorbed DNA oligonucleotides. Data from SPR imaging is used to construct a quantitative adsorption isotherm of the **hybridization** adsorption on a surface. DNA and RNA 18-mer oligonucleotide **hybridization** adsorption is found to follow a Langmuir isotherm with an adsorption coefficient of 1.8 x 10(7) M(-1).

L14 ANSWER 4 OF 11 MEDLINE on STN
AN 2001079284 MEDLINE
DN PubMed ID: 11031275
TI **Surface plasmon resonance** imaging measurements of ultrathin organic films.
AU Brockman J M; Nelson B P; Corn R M
CS Department of Chemistry, University of Wisconsin-Madison, Madison, Wisconsin 53706-1396, USA.. brockman@corninfo.chem.wisc.edu
NC R01-GM59622-01 (NIGMS)
SO Annual review of physical chemistry, (2000) 51 41-63. Journal code: 15040080R. ISSN: 0066-426X.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 200101
ED Entered STN: 20010322
Last Updated on STN: 20010322
Entered Medline: 20010111
AB The surface-sensitive optical technique of surface plasmon resonance (SPR) imaging is used to characterize ultrathin organic and biopolymer films at metal interfaces in a spatially resolved manner. Because of its high surface sensitivity and its ability to measure in real time the interaction of unlabeled biological molecules with arrays of surface-bound **species**, SPR imaging has the potential to become a powerful tool in biomolecular investigations. Recently, SPR imaging has been successfully implemented in the characterization of supported lipid bilayer films, the monitoring of antibody-antigen interactions at surfaces, and the study of DNA **hybridization** adsorption. The following is included in this review: (a) an introduction to the principles of surface plasmon resonance, (b) the details of SPR imaging instrumental design, (c) a short discussion concerning resolution, sensitivity, and quantitation in SPR imaging, (d) the details of DNA array fabrication on chemically modified gold surfaces, and (e) two examples that demonstrate the application of the SPR imaging technique to the study of protein-DNA interactions.

L14 ANSWER 5 OF 11 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2003:203287 CAPLUS
DN 138:232950
TI Label-free detection of immobilized nucleic acids via **surface plasmon resonance**
IN Nelson, Bryce P.; Liles, Mark R.; Frederick, Kendra; Corn, Robert M.; Goodman, Robert M.

09567863

PA USA
SO U.S. Pat. Appl. Publ., 20 pp., Cont.-in-part of U.S. Ser. No. 456,038.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2003049639	A1	20030313	US 2001-998551	20011129
	US 6127129	A	20001003	US 1999-368991	19990805
	US 2002044893	A1	20020418	US 1999-456038	19991203
	US 6489102	B2	20021203		
	US 2003044835	A1	20030306	US 2002-260923	20020930
	WO 2003048723	A2	20030612	WO 2002-US37362	20021121
	WO 2003048723	A3	20031127		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRAI	US 1999-132342P	P	19990504
	US 1999-368991	A3	19990805
	US 1999-456038	A2	19991203
	US 2001-998551	A	20011129

AB The invention claims a method to detect unlabeled nucleic acids (DNA and/or RNA) in a sample by measuring their **hybridization** to an array of immobilized nucleic acid probes with surface plasmon resonance (SPR) imaging. Taxa-specific, **species**-specific, or organelle-specific nucleic acids are affixed to an SPR-suitable substrate such as gold metal. A nucleic acid sample to be analyzed is then contacted with the SPR-substrate and the substrate analyzed to determine the presence or absence of specific **hybridization** between the nucleic acids bound to the substrate and the nucleic acids contained in the sample. The method does not require that either the bound nucleic acids or the sample nucleic acids be labeled. SPR substrates can be constructed by depositing an array of discrete, unprotected ω-modified alkanethiol spots on exposed metal, attaching nucleic acid probes to alkanethiol spots, and contacting the substrate with nucleic acid sample(s). The method can be used to identify the source of nucleic acids, their sequence, as well as to identify organisms and place them within a given **taxonomic** hierarchy. Examples of the invention describe multi-step array fabrication, **species** -specific identification of Escherichia coli and Bacillus subtilis rRNA using total RNA or in vitro transcribed total RNA samples, and reuse of arrays. Another example describes use of the invention to quantitate the sequence-specific **hybridization** of unlabeled 18-mer oligonucleotides.

L14 ANSWER 6 OF 11 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:203707 CAPLUS
TI **Surface plasmon resonance** imaging studies of DNA and protein microarrays
AU Corn, Robert M.; Nelson, Bryce P.; Smith, Emily; Hurtt, Greta
CS Department of Chemistry, University of Wisconsin, Madison, WI, 53706-1396, USA
SO Abstracts of Papers - American Chemical Society (2001), 221st, PMSE-011

09567863

CODEN: ACSRAL; ISSN: 0065-7727
PB American Chemical Society
DT Journal; Meeting Abstract
LA English
AB Surface plasmon resonance (SPR) imaging is a surface-sensitive spectroscopic technique for measuring interactions between unlabeled biol. mols. with arrays of surface bound **species**. In this talk, the application of SPR imaging for the label free detection of DNA, RNA and protein mols. by adsorption onto DNA and protein microarrays on gold surfaces is presented. Specifically, SPR imaging is used to quant. detect the **hybridization** adsorption of short unlabeled DNA oligonucleotides at low concentration, as well as the **hybridization** adsorption of unlabeled RNA oligonucleotides and larger 16S rRNA (rRNA) isolated from the microbe Escherichia coli onto DNA arrays. The covalent attachment of thiol-DNA probes to the gold surface leads to high surface probe d. (10E12 mols./cm2) and excellent probe stability. Addnl. examples of protein microarrays will also be presented.

L14 ANSWER 7 OF 11 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN
AN 2003-465544 [44] WPIDS
CR 1997-235174 [21]; 2002-146684 [19]; 2002-234945 [29]; 2002-371283 [40]
DNN N2003-370259 DNC C2003-124051
TI Composition for use in a biosensor or **surface plasmon resonance** chip or in biosensing applications and test assays, comprises a self-assembled monolayer-forming **species**, and optionally a surface.
DC A89 B04 D16 S03
IN BAMDAD, C C; SIGAL, G B; STROMINGER, J L; WHITESIDES, G M
PA (HARD) HARVARD COLLEGE
CYC 1
PI US 6472148 B1 20021029 (200344)* 28
ADT US 6472148 B1 CIP of US 1994-312388 19940926, US 1997-786187 19970121
FDT US 6472148 B1 CIP of US 5620850
PRAI US 1997-786187 19970121; US 1994-312388 19940926
AN 2003-465544 [44] WPIDS
CR 1997-235174 [21]; 2002-146684 [19]; 2002-234945 [29]; 2002-371283 [40]
AB US 6472148 B UPAB: 20030710
NOVELTY - A composition (I) comprising a self-assembled monolayer-forming **species**, and optionally comprising a surface, is new.

DETAILED DESCRIPTION - A composition (I) comprises a self-assembled monolayer-forming **species**, and optionally comprises a surface. The self-assembled monolayer forming **species** has a formula (F1).

X-R-NA-NAB (F1)

X = functional group that adheres to the surface;

R = spacer group that promotes formation of a self-assembled monolayer of a number of **species**;

NA = nucleic acid strand; and

NAB = biological binding partner of NA.

USE - (I) Is useful for the determination of analytes, for example from a fluid medium using a biological binding partner of the analyte. (I) Is useful for capturing a biological molecule, as a biosensor element, or as a surface plasmon resonance chip. (I) Is useful to detect DNA **hybridization** (human genome project, diagnostic scanning of DNA for genetic mutants), to present DNA-binding proteins for the study of subsequent protein-protein interactions for when the DNA binding is a critical element of the interaction, for biosensing applications (such as drug screening, environmental monitoring, medical diagnostics, and quality control in the pharmaceutical and food industries), test assays (such as diagnostic, analytical or microanalytical procedures, forensic analysis, pharmacokinetic study, cell sorting procedure, affinity chromatogram, or industrial or laboratory recovery or analysis of one or more **species** such as toxins, catalysts, or starting materials or

products), or in the study of interacting proteins and protein-DNA complexes that regulate gene transcription.

ADVANTAGE - (I) Determines analytes with high sensitivity. (I) Sensitively determines biological binding between partners. (I) Precisely and accurately determines interactions of large protein-DNA complexes with DNA-bound transcription factors.

Dwg.0/10

L14 ANSWER 8 OF 11 USPATFULL on STN
AN 2003:161898 USPATFULL
TI Instruments, methods and reagents for **surface plasmon resonance**
IN Natan, Michael J., Los Altos, CA, United States
Goodrich, Glenn, State College, PA, United States
He, Lin, Mountain View, CA, United States
Lyon, L. Andrew, Marietta, GA, United States
Musick, Michael D., Huntingdon Valley, PA, United States
Keating, Christine D., Lemont, PA, United States
PA SurroMed, Inc., Mountain View, CA, United States (U.S. corporation)
PI US 6579726 B1 20030617
AI US 2000-629790 20000731 (9)
PRAI US 2000-198699P 20000420 (60)
US 2000-190394P 20000317 (60)
US 1999-146694P 19990730 (60)
US 1999-146606P 19990730 (60)
US 1999-168831P 19991203 (60)
US 1999-163789P 19991105 (60)
DT Utility
FS GRANTED
EXNAM Primary Examiner: Chin, Christopher L.
LREP Swanson & Bratschun, LLC
CLMN Number of Claims: 14
ECL Exemplary Claim: 1
DRWN 22 Drawing Figure(s); 10 Drawing Page(s)
LN.CNT 1521
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods and reagents for the enhancement of surface plasmon resonance (SPR)-based detection assays. The methods and reagents can be used in any molecular recognition assay that uses a solid support. The invention also provides an SPR instrument that operates in imaging mode.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L14 ANSWER 9 OF 11 USPATFULL on STN
AN 2003:161894 USPATFULL
TI Biosensing using **surface plasmon resonance**
IN Natan, Michael J., Los Altos, CA, United States
Pena, David J., State College, PA, United States
Goodrich, Glenn, State College, PA, United States
He, Lin, Mountain View, CA, United States
Lyon, L. Andrew, Marietta, GA, United States
Musick, Michael D., Huntingdon Valley, PA, United States
Holliway, William D., Atlanta, GA, United States
PA SurroMed, Inc., Palo Alto, CA, United States (U.S. corporation)
PI US 6579721 B1 20030617
AI US 2000-711748 20001113 (9)
RLI Continuation of Ser. No. US 2000-629790, filed on 31 Jul 2000
PRAI US 1999-165075P 19991112 (60)
US 1999-170682P 19991214 (60)
US 1999-168831P 19991203 (60)
US 1999-163789P 19991105 (60)

US 1999-146606P 19990730 (60)
US 1999-146694P 19990730 (60)
US 1999-146694P 19990730 (60)
US 2000-190394P 20000317 (60)
US 2000-198699P 20000420 (60)
DT Utility
FS GRANTED
EXNAM Primary Examiner: Snay, Jeffrey
LREP Swanson & Bratschun, LLC
CLMN Number of Claims: 10
ECL Exemplary Claim: 1
DRWN 32 Drawing Figure(s); 13 Drawing Page(s)
LN.CNT 2003
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods and reagents for the enhancement of surface plasmon resonance (SPR)-based detection assays. The methods and reagents can be used in any molecular recognition assay that uses a solid support. The invention also provides an SPR instrument that operates in imaging mode.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L14 ANSWER 10 OF 11 USPATFULL on STN
AN 2003:146381 USPATFULL
TI Fusion protein arrays on metal substrates for **surface plasmon resonance** imaging
IN Corn, Robert M., Madison, WI, UNITED STATES
Smith, Emily A., Madison, WI, UNITED STATES
Weisblum, Bernard, Madison, WI, UNITED STATES
Erickson, Matthew G., Madison, WI, UNITED STATES
Ulijasz, Andrew T., Madison, WI, UNITED STATES
Wanat, Matthew J., Madison, WI, UNITED STATES
PI US 2003100127 A1 20030529
AI US 2002-99424 A1 20020315 (10)
PRAI US 2002-362178P 20020306 (60)
US 2001-304246P 20010710 (60)
DT Utility
FS APPLICATION
LREP DEWITT ROSS & STEVENS S.C., 8000 EXCELSIOR DR, SUITE 401, MADISON, WI, 53717-1914
CLMN Number of Claims: 78
ECL Exemplary Claim: 1
DRWN 8 Drawing Page(s)
LN.CNT 1886
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB Disclosed are methods for making surface plasmon resonance-capable arrays wherein molecules, such as proteins or nucleic acids, or cells, are adhered to a metal substrate. The metal substrates are modified by depositing an ω-modified alkanethiol monolayer to the substrate and then contacting the ω-modified monolayer with a heterobifunctional linking compound. Biomolecules or cells can then be attached to the heterobifunctional linking compound. Also disclosed are arrays wherein glutathione-containing molecules are immobilized on the substrate and GST-containing molecules are then specifically immobilized onto the substrate, taking advantage of the affinity between glutathione and GST.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L14 ANSWER 11 OF 11 USPATFULL on STN
AN 2003:23739 USPATFULL
TI **Surface plasmon resonance** imaging of

09567863

micro-arrays
IN Corn, Robert M., Madison, WI, UNITED STATES
Lee, Hye Jin, Madison, WI, UNITED STATES
Goodrich, Terry T., Madison, WI, UNITED STATES
PI US 2003017579 A1 20030123
AI US 2002-192026 A1 20020710 (10)
PRAI US 2001-304246P 20010710 (60)
DT Utility
FS APPLICATION
LREP DEWITT ROSS & STEVENS S.C., 8000 EXCELSIOR DR, SUITE 401, MADISON, WI, 53717-1914
CLMN Number of Claims: 31
ECL Exemplary Claim: 1
DRWN 6 Drawing Page(s)
LN.CNT 1044
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB Disclosed is a method for fabricating 1-dimensional micro-arrays using parallel micro-fluidic channels on chemically-modified metal, carbon, silicon, and/or germanium surfaces; a μL detection volume method that uses 2-dimensional nucleic acid micro-arrays formed by employing the 1-dimensional DNA micro-arrays in conjunction with a second set of parallel micro-fluidic channels for solution delivery, and the 1-dimensional and 2-dimensional arrays used in the methods. The methodology allows the rapid creation of 1- and 2-dimensional arrays for SPR imaging and fluorescence imaging of DNA-DNA, DNA-RNA, DNA-protein, and protein-protein binding events. The invention enables very small volumes necessary for a variety of bioassay applications to be analyzed by SPR. Target solution volumes as small as 200 pL can be analyzed.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

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